CLAIMS

1. A wood-treatment method by *in situ* polymerization, comprising:

- a first step for impregnating a wooden part with organic monomers selected from

(A) drying oils and/or

(B) at least one first reactant including at least two glycidyl functions and at least one second reactant including at least two primary amine or secondary amine -NH functions, the average functionality of the whole of the first and second reactants being strictly greater than 2,

- a second step for exposing the thereby impregnated wood to electromagnetic radiation with a wavelength (λ) between 1 and 10^{-3} meters for a total period between 5 seconds and 40 seconds and with a power between 300 and 1,000 Watts.

2. The wood-treatment method according to claim 1, characterized by the fact that the step for impregnating the wood with organic monomers is performed under a pressure of 0.4 to 1 MPa.

3. The wood-treatment method according to claim 1 to 2, characterized by the fact that the electromagnetic radiation has a wavelength between 10^{-1} and 10^{-2} meters.

4. The wood-treatment method according to any of the preceding claims, characterized by the fact that the exposure time to electromagnetic radiation is between 15 and 30 seconds.

5. The wood-treatment method according to any of the preceding claims, characterized by the fact that the exposure to electromagnetic radiation is performed in several periods of shorter duration, separated by periods for cooling the wood.

6. The wood-treatment method according to any of the preceding claims, characterized by the fact that the exposure to electromagnetic radiation is performed in a microwave oven with a power output at least equal to 300 Watts, preferably between 400 and 1,000 Watts.

7. The wood-treatment method according to any of the preceding claims, characterized by the fact that the wooden part is a

blank having the shape of a hollow cylinder suitable for making wind instruments.

8. The wood-treatment method by *in situ* polymerization according to any of the preceding claims, characterized by the fact that it comprises:

(a) immerging a part in open porosity wood in a solution containing, in a volatile organic solvent, at least one first reactant including at least two glycidyl functions and at least one second reactant including at least two primary amine or secondary amine -NH functions, the average functionality of the whole of the first and second reactants being strictly greater than 2, for sufficient time so as to allow at least 60% of the accessible pore volume of the wood to be filled with the solution, and at a sufficiently low temperature for preventing too early polymerization of the monomers during this impregnation step (a),

(b) removing the part impregnated with the organic solution and draining and/or wiping the wooden part,

(c) exposing the thereby impregnated wood to electromagnetic radiation with a wavelength (λ) between 1 and 10^{-3} meters for a total time between 5 seconds and 40 seconds and with a power between 300 and 1,000 Watts and optionally,

(d) drying the part, preferably under reduced pressure, for sufficient time to allow evaporation of the organic solvent.

9. The wood-treatment method according to claim 8, characterized by the fact that the open porosity wood used is wenge (*Milletia laurentii*), lime tree, spruce, monpani, or poplar, preferably wenge.

10. The wood-treatment method according to claim 8 or 9, characterized by the fact that the first reactant including at least two glycidyl functions is selected from 1,4-butanediol diglycidyl ether, 1,6-hexanediol diglycidyl ether, neopentylglycol diglycidyl ether, trimethylolpropane polyglycidyl ether, hexahydroxyphtalic acid diglycidyl ester, bisphenol A diglycidyl ether, diglycidyl ethers of polyalkyleneglycols such as diethyleneglycol diglycidyl ether, triethyleneglycol diglycidyl ether, polyethyleneglycol diglycidyl ether, or polypropyleneglycol diglycidyl ether, glycerol diglycidyl ether, diglycerol diglycidyl ether, or polyglycerol diglycidyl ether, sorbitol polyglycidyl ether.

11. The wood-treatment method according to any of claims 8 to 10, characterized by the fact that the second reactant including at least two amine functions is selected from ethylenediamine, diethylenetriamine, tetraethylenepentamine, aminoethylpiperazine, benzyldimethylamine, piperidine, 2-methylpentamethylenediamine, diaminodiphenylmethane, diaminodiphenylsulfone, 1,3-pentane-diamine, hexamethylenediamine, bis(hexamethylene)-triamine, 1,2-diaminocyclohexane, 4-benzylaniline, N,N'-dimethyldiamino-diphenylmethane, hexylamine and N,N'-dimethylhexamethylene-diamine.

12. The wood-treatment method according to any of claims 8 to 11, characterized by the fact that the volatile organic solvent used in step (a) has a melting point less than -30°C and a boiling point less than 250°C, preferably less than 150°C.

13. The wood-treatment method according to claim 12, characterized by the fact that the volatile organic solvent is selected from hydrocarbon compounds with a C_{1-6} backbone and including at least one polar group selected from secondary alcohol, ether and ester functions, and from vegetable oils.

14. The wood-treatment method according to claim 13, characterized by the fact that the volatile organic solvent is 1-methoxy-2-propanol.

15. The wood-treatment method according to any of claims 8 to 14, characterized by the fact that the impregnation of the wooden part with the organic solution in step (a) is performed at a temperature less than 20°C, preferably less than 10°C, and in particular at a temperature close to 5°C, and for a time at least equal to 5 days, preferably between 10 and 30 days.

16. The wood-treatment method according to any of claims 1 to 7, characterized by the fact that it comprises

(a) immerging a wooden part in a drying oil or a mixture of drying oils for sufficient time to allow at least 60% of the accessible pore volume of the wood to be filled with the oil, and at a sufficiently low temperature to prevent too early polymerization of the oil during this impregnation step (a),

(b) removing the part impregnated with the drying oil and draining and/or wiping the wooden part,

(c) exposing the thereby impregnated wood to electromagnetic radiation with a wavelength (λ) between 1 and 10^{-3} meters for a total time between 5 seconds and 40 seconds and with a power between 300 and 1,000 Watts.

17. The wood-treatment method according to claim 16, characterized by the fact that the impregnation step (a) is applied at a temperature between room temperature and 80°C and for a time between 6 and 48 hours, preferably between 6 and 24 hours.

18. The wood-treatment method according to claim 16 or 17, characterized by the fact that the wood is selected from ebonies and rosewoods.

19. The wood-treatment method according to any of claims 16 to 18, characterized by the fact that the drying oil is selected from linseed oil, isomerized linseed oil, castor oil, dehydrated castor oil, oil from aleurites, oiticica oil and isano oil.

20. The wood-treatment method according to any of claims 16 to 19, characterized by the fact that the drying oil is used as a mixture with one or more semi-drying oils, preferably with 0.1 to 0.5 parts by weight of one or more semi-drying oils selected from cameline oil, safflower oil, hempseed oil, pumpkin oil, melon oil, niger seed oil, walnut oil, poppy seed oil, perilla oil, grape seed oil, sesame oil, soya beam oil, tobacco oil and sunflower oil.

21. The wood-treatment method according to any of claims 16 to 20, characterized by the fact that the drying oil is used as a mixture with unsaturated fatty acids, preferably with 0.05 to 0.2 parts by weight of a mixture of fatty acids of linseed oil or castor oil.

22. The wood-treatment method according to any of the preceding claims, characterized by the fact that the drying oil, optionally as a mixture with one or more semi-drying oils and/or with unsaturated fatty acids, is further diluted with one or more volatile organic solvents miscible with the oily phase.

23. The wood-treatment method according to any of claims 16 to 22, characterized by the fact that one or more promoters of the polymerization reaction are added to the drying oil.

24. A part in a wood/resin composite material capable of being made by the method according to any of the preceding claims.

25. The use of a part according to claim 24 for making the whole or part of wind instruments, in particular clarinets, for marquetry, for joinery, for the construction of buildings and in particular frameworks.

26. The use of the method according to any of claims 1 to 23 for restoration and/or preservation of ancient woods.

27. The use of the method according to any of claims 1 to 23 for reducing or even suppressing the step for natural and/or artificial drying of the wood before machining.